Solar radio burst interference index dedicated to GNSS single and double frequency users

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Intense solar radio bursts (SRBs) emitted at L-band frequencies are a source of radio frequency interference for Global Navigation Satellite Systems (GNSS) by inducing a noise increase in GNSS measurements, and hence degrading the carrier-to-noise density (C/N\textsubscript{0}). Such space weather events are critical for GNSS-based applications requiring real-time high-precision positioning.

Since 2015, the Royal Observatory of Belgium (ROB) monitors in near real-time the C/N\textsubscript{0} observations from the European Permanent Network (EPN). The monitoring allows to detect accurately the general fades of C/N\textsubscript{0} due to SRBs over Europe as from 1 dB-Hz. It provides in near real-time a quantification of the GNSS signal reception fade for the L1 C/A and L2 P(Y) signals and notifies civilian single and double frequency users with a 4-level index corresponding to the potential impact on their applications. This service is part of the real-time monitoring service of the PECASUS project of the International Civil Aviation Organization (ICAO) which started end of 2019.

Results of this 5-year monitoring will be discussed, including the 3 SRBs of 2015 and 2017, together with the new developments toward a global index using the International GNSS Service (IGS) network. In addition, we will show how the SRB monitoring is sometimes interfered by GPS flex power campaigns on the satellites from blocks IIR-M and IIF, and how it is mitigated. The routine and transient GPS flex power campaigns will be presented in terms of C/N\textsubscript{0} variations for the EPN and IGS networks.